

CLAIMS

We claim:

1. A catalytic material comprising:

5 a catalytic phase comprising particles of a catalytic material, said catalytic particles having a size distribution and

an electronically active support matrix, said electronically active support matrix mechanically supporting said catalytic phase, said catalytic phase being dispersed in a spatial distribution on said electronically active support matrix;

10 wherein said electronically active support matrix interacts electronically with said catalytic phase, said electronic interaction originating from wavefunction overlap between said catalytic phase and said electronically active support matrix, said electronic interaction modifying a catalytic property of said catalytic phase relative to said catalytic property of said catalytic phase when supported on an inert support matrix.

15 2. The catalytic material of claim 1, wherein said catalytic phase comprises a transition metal.

3. The catalytic material of claim 1, wherein said catalytic phase comprises nickel.

4. The catalytic material of claim 1, wherein said electronically active support matrix comprises a metal oxide.

5. The catalytic material of claim 1, wherein said electronically active support matrix comprises
20 a metal.

6. The catalytic material of claim 1, wherein said electronic interaction is a bonding type interaction.

7. The catalytic material of claim 1, wherein said electronic interaction is an anti-bonding type

interaction.

8. The catalytic material of claim 1, wherein said electronic interaction is a donor-acceptor type interaction.

9. The catalytic material of claim 1, wherein said electronic interaction induces a perturbation in the magnitude or spatial distribution of electron density at or near the surface of said catalytic phase.

10. The catalytic material of claim 1, wherein said electronic interaction causes delocalization of electron density from said catalytic phase to said electronically active support matrix.

11. The catalytic material of claim 1, wherein said catalytic phase is non-catalytic when supported on said inert support matrix.

12. The catalytic material of claim 1, wherein said modified catalytic property of said catalytic phase supported on said electronically active support matrix is relative to said catalytic phase having said particle size distribution and dispersed in said spatial distribution when supported on said inert support matrix.

13. The catalytic material of claim 1, wherein said catalytic property is a chemical reaction rate.

14. The catalytic material of claim 1, wherein said catalytic property is selectivity.

15. The catalytic material of claim 1, wherein said modified catalytic property provides a faster chemical reaction rate at temperatures of 20 °C or below.

16. The catalytic material of claim 1, wherein said catalytic material is included in a rechargeable battery and said modified catalytic properties provide faster discharge rates of said rechargeable battery.

17. The catalytic material of claim 16, wherein said rechargeable battery is a nickel metal hydride battery.